

## PATENT ABSTRACTS OF JAPAN

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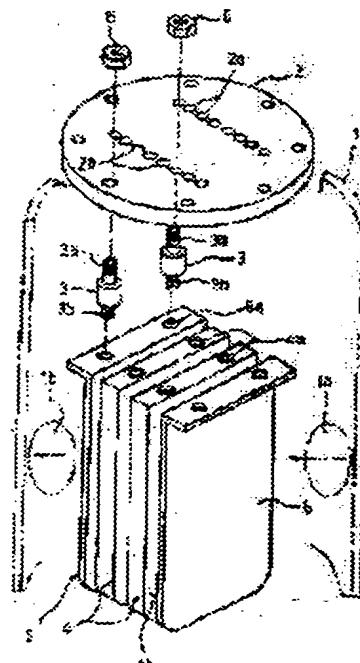
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**(54) GERMICIDAL/ALGICIDAL APPARATUS AND METHOD FOR LIQUID USING METAL ION AND CHLORINE**

**(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide the subject apparatus intended for having germicidal/ algicidal effect on the water in water treatment facilities through electrolyzing metallic plates, and so designed as to generate metal ions and relatively small amounts of chlorine using no chlorine-based chemical agent at all so as to easily and safely exhibit extremely high germicidal/algicidal effect.

**SOLUTION:** This germicidal/algicidal apparatus is intended for the water in water treatment facilities through such a scheme that, an ion/chlorine generator composed of a plurality of metallic plates is set up midway of a flow channel through which water containing necessary concentrations of salt(s) is circulated to a water treatment facility, the metallic plates are electrolyzed, and the resulting metal ions and chlorine thus generated are fed, via the flow channel, to the facility; wherein the metallic plates consist of one or more copper, silver or copper-silver alloy electrode plates 4 and platinum-coated two titanium electrode plates 5, and the two titanium electrode plates 5 are arranged so as to stand each against the other one electrode plate on both sides sandwiched thereby, or stand each against the outside face of one of the other electrode plates located on the outermost side.



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## CLAIMS

## [Claim(s)]

[Claim 1] The ion and chlorine generator which has the metal plate of two or more sheets arranged so that predetermined spacing might be set and it might counter mutually in the middle of the passage which makes the water containing the salinity of necessary concentration return to a water facility are formed. It is sterilization algicidal equipment which is made to electrolyze the metal plate with the power from a power supply section, sends out the metal ion and chlorine which this produced to a water facility through said passage, and performs sterilization \*\*\*\* of the water of this water facility. Said metal plate consists of one copper pole plate, a silver plate or a copper/silver alloy plate, and the titanium plate of two sheets that coated platinum. this — the both sides into which the titanium plate of two sheets inserted said plate of one sheet — this — the sterilization algicidal equipment of the liquid by metal ion \*\*\*\*\* characterized by being arranged, respectively so that it may counter with the plate of one sheet.

[Claim 2] The ion and chlorine generator which has the metal plate of two or more sheets arranged so that predetermined spacing might be set and it might counter mutually in the middle of the passage which makes the water containing the salinity of necessary concentration return to a water facility are formed. It is sterilization algicidal equipment which is made to electrolyze the metal plate with the power from a power supply section, sends out the metal ion and chlorine which this produced to a water facility through said passage, and performs sterilization \*\*\*\* of the water of this water facility. Said metal plate Two or more copper pole plates, a silver plate, or a copper/silver alloy plate, from the titanium plate of two sheets which coated platinum — changing — this — the sterilization algicidal equipment of the liquid by metal ion \*\*\*\*\* characterized by being arranged, respectively so that the titanium plate of two sheets may counter with the lateral surface of the plate of two sheets arranged in the outermost part among said plates of two or more sheets.

[Claim 3] It has one copper pole plate, a silver plate or a copper/silver alloy plate, and the titanium plate of two sheets that coated platinum. this — the both sides into which the titanium plate of two sheets inserted said plate of one sheet — this — the ion and chlorine generator currently arranged, respectively so that it may counter with the plate of one sheet The sterilization algicidal approach of the liquid characterized by sending out the metal ion and chlorine which prepared in the middle of, and were made to electrolyze those plates with the power from a power supply section, and this produced to a water facility through said passage, and performing sterilization \*\*\*\* of the water of this water facility. [ the passage which makes the water containing the salinity of necessary concentration return to a water facility ]

[Claim 4] Two or more copper pole plates, silver plate, or copper/silver alloy plate arranged so that predetermined spacing might be kept and it might counter mutually. the titanium plate of two sheets which coated platinum — having — this — the titanium plate of two sheets The ion and chlorine generator currently arranged, respectively so that it may counter with the lateral surface of the plate of two sheets arranged in the outermost part among said plates of two or more sheets The sterilization algicidal approach of the liquid characterized by sending out the metal ion and chlorine which prepared in the middle of, and were made to electrolyze those plates with the power from a power supply section, and this produced to a water facility through

said passage, and performing sterilization \*\*\*\* of the water of this water facility. [ the passage which makes the water containing the salinity of necessary concentration return to a water facility ]

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

## [0001]

[Field of the Invention] This invention forms an ion generator in water facilities, such as an organ bath, a pond, a fountain, a pool, and a tank, in the middle of the channel which makes water flow back, and relates the water of a water facility to sterilization, algicidal \*\*\*\* equipment, and an approach with the metal ion generated by the ion generator.

## [0002]

[Description of the Prior Art] Conventionally, the generator of the metal ion equipped with two or more metal plates in the middle of the passage which makes the water of the specified quantity flow back is formed in water facilities, such as an organ bath, a pond, a fountain, a pool, and a tank, the metal plate concerned is electrolyzed, a metal ion is generated, and the sterilization algicidal equipment which performs sterilization or \*\*\*\* for the water of said water facility by the metal ion especially complex ion, a copper ion, etc. is known (for example, JP,2-66294,U). The sterilization algicidal equipment using this metal ion is excellent in sterilizing properties and the algicidal force, and has been adopted widely in recent years [ — there are many advantages that it is cheap and easy to use — ].

## [0003]

[Problem(s) to be Solved by the Invention] However, since there was a limitation also in the sterilizing properties of complex ion, and the algicidal force of a copper ion when the dirt of water, such as said tank, was severe, in order to carry out sterilization purification of those water, the long duration important point was carried out. Then, chlorine-based drugs (sodium hypochlorite etc.) needed to be added to said water facility, and the sterilization algicidal force needed to be reinforced by the catalysis by the metal ion. Consequently, it became cost quantity and the activity was complicated. Furthermore, by adding chlorine-based drugs to a water facility, hot spring \*\*\*\* changed, or the filtration circulation facility carried out oxidation corrosion, and there was a problem of the life (endurance) having become short or giving the user of a water facility displeasure, such as a stimulus to chlorine stink, an eye, the skin, \*\*\*\*, etc.

[0004] This invention was made in view of the above-mentioned fault, without using entirely the chlorine-based drugs which do effect harmful to the body etc., according to the synergistic effect of a metal ion and comparatively a small amount of chlorine, is simple and safe and aims at offering the sterilization algicidal equipment and the approach of a liquid of having enabled it to demonstrate moreover very high sterilization and an algicidal effect.

## [0005]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the sterilization algicidal equipment of the liquid by the metal ion and chlorine concerning this invention The ion and chlorine generator which has the metal plate of two or more sheets arranged so that predetermined spacing might be set and it might counter mutually in the middle of the passage which makes the water containing the salinity of necessary concentration return to a water facility are formed. It is sterilization algicidal equipment which is made to electrolyze the metal plate with the power from a power supply section, sends out the metal ion and chlorine

which this produced to a water facility through said passage, and performs sterilization \*\*\*\* of the water of this water facility. from the titanium plate of two sheets with which said metal plate coated one copper pole plate, a silver plate or a copper/silver alloy plate, and platinum — changing — this — the both sides into which the titanium plate of two sheets inserted said plate of one sheet — this — it is characterized by being arranged, respectively so that it may counter with the plate of one sheet.

[0006] moreover — from the titanium plate of two sheets with which said metal plate coated two or more copper pole plates, a silver plate or a copper/silver alloy plate, and platinum — changing — this — the titanium plate of two sheets may be arranged, respectively so that it may counter with the lateral surface of the plate of two sheets arranged in the outermost part among said plates of two or more sheets.

[0007] Furthermore, the sterilization algicidal approach of the liquid concerning this invention It has one copper pole plate, a silver plate or a copper/silver alloy plate, and the titanium plate of two sheets that coated platinum. this — the both sides into which the titanium plate of two sheets inserted said plate of one sheet — this — the ion and chlorine generator currently arranged, respectively so that it may counter with the plate of one sheet It is characterized by sending out the metal ion and chlorine which prepared in the middle of, and were made to electrolyze those plates with the power from a power supply section, and this produced to a water facility through said passage, and performing sterilization \*\*\*\* of the water of this water facility. [ the passage which makes the water containing the salinity of necessary concentration return to a water facility ]

[0008] Moreover, the ion and chlorine generator used for invention of said approach Two or more copper pole plates, silver plate, or copper/silver alloy plate arranged so that predetermined spacing might be kept and it might counter mutually, the titanium plate of two sheets which coated platinum — having — this — it is good also as a configuration currently arranged, respectively so that the titanium plate of two sheets may counter with the lateral surface of the plate of two sheets arranged in the outermost part among said plates of two or more sheets.

[0009]

[Function] Since this invention has a configuration like the above, if it arranges the above-mentioned ion and chlorine generator into the water containing salinity and energizes it to the above-mentioned metal plate, a metal ion and chlorine will be generated and it will generate the catalysis of a metal ion, and the conjointly very high sterilization algicidal force.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. The sterilization algicidal equipment concerning this invention mainly consists of ion and a chlorine generator 16, and a power unit 17, and drawing 1 , 2 (A), (B), 3 (A), and (B) are the detail drawing of an example of ion and a chlorine generator. Among these, for drawing 1 , the perspective view of the important section of ion and the chlorine generator 16 and drawing 2 (A) are [ this side elevation drawing 3 (A), and (B of the front view of an appearance schematic diagram and drawing 2 (B)) ] the outline side elevations of an important section. Casing to which 1 carried out \*\*\*\*\* short tubed one in the air in these drawings, inhalation opening of the water which prepared 1a in one side face of the casing 1, and 1b are the deliveries of water established in the opposed face of inhalation opening 1a. 2 is the horizontal plate held horizontally in casing 1, and two or more engagement hole 2a is formed in this horizontal plate 2, and let that magnitude be the magnitude which was formed in the end section of a bolt 3 and which \*\*\*\*s and can insert in 3a.

[0011] It is formed in a longwise rectangle. 4 and 5 — a metal plate — it is — 4 [ among these, ] — a silver plate, a silver plate, or a copper/silver alloy plate — the example of illustration (henceforth the metal plate 4) — abbreviation — Tapped hole 4a is drilled by that end, and while screwing and attaching end 3b (lower limit side) of said bolt 3 in this tapped hole 4a, other end side 3a (upper limit side) is inserted in engagement hole 2a of said horizontal plate 2, and is bound with a nut 6 from the horizontal plate 2 bottom. Moreover, 5 is thinly formed in the thickness below one half from the thickness of said metal plate 4 in (it is called the titanium plate 5 below) and the example of illustration with the titanium plate which has advanced

corrosion resistance, and in order to raise insolubility, endurance, the safety of electrolysis water quality, etc., coating (plating or baking) of it is carried out with platinum (in addition to this platinum groups, such as iridium, palladium, and a rhodium). In addition, as for the coating thickness of platinum, it is common to make it 1-5 micrometers. The end of this titanium plate 5 is bent and processed into a right angle, inserts end 3b (lower limit side) of said bolt 3 in tapped hole 5a, and binds it with a nut 6 from the bottom. Moreover, other end side 3a (upper limit side) of a bolt 3 is inserted in engagement hole 2a of said horizontal plate 2, and is bound with a nut 6 from the horizontal plate 2 bottom. In addition, the metal plate 4 and the titanium plate 5 are not limited to the configuration of illustration, but its configurations, such as other squares, a round head, and a trigonum, are arbitrary. Thus, as for the metal plate 4, at least one sheet may be two or more sheets to the attached titanium plate 5 usually being used by two sheets. When the number of the metal plates 4 is one, as shown in drawing 3 (A), the titanium plate 5 of two sheets sandwiches the metal plate 4, and it is hung, respectively and is arranged so that it may counter with the fields 4b and 4b of the both sides of this metal plate 4. Moreover, as shown in drawing 1 or drawing 3 (B), when the number of the metal plates 4 is [ two or more ] (it has illustrated as three sheets by two sheets and drawing 3 (B) at drawing 1 ), the metal plate 4 is arranged so that it may counter with the lateral surface 4b and 4b of the metal plate 4 of two sheets arranged in the outermost part among the metal plates 4 with which the titanium plate 5 was arranged such, while being installed continuously.

[0012] Next, a power unit 17 supplies the electrical and electric equipment to ion and the chlorine generator 16, and doubles and has the function which controls the change to operating time, an anode plate, and cathode, quantity of electricity, etc.

[0013] Drawing 4 is the schematic diagram having shown the water cycle system by which the sterilization algicidal equipment concerning this invention is carried out. Among these, water sources of supply, such as a filter with which 11 supplies water facilities, such as a pond, a pool, and a tank, to the water facility 11, and 12 supplies water, a tank, and a water supply system, and 13 are the water source of supply 12 and the passage where the water facility 11 was made for a bond and predetermined amount of water to flow. And ion and the chlorine generator 16 are formed through the various bulbs 15 (bypass-valve 15a, drain valve 15b) in the middle of this passage 13. Moreover, ion and the chlorine generator concerned are connected with the power unit 17 through the output cable 18. The sodium chloride (salt) required for making the water which circulates through this water cycle system generate chlorine is added. Although the salinity contained in water may be comparatively low, specifically, the numeric value is relatively determined by the class of water facility, the size of amount of water, etc.

[0014] And if the water containing this salinity is supplied in ion and the chlorine generator 16 through inhalation opening 1a through passage 13 from the water source of supply 12, makes said titanium plate 5 an anode plate and energizes as cathode it and the metal plate 4 with which it counters. A sodium chloride is electrolyzed between the titanium plates 5 and the metal plates 4 concerned concerned, chlorine (hypochlorous acid) is generated, and the metal ion of silver, copper, or copper/silver is generated between both other metal plate 4. On the other hand, the titanium plate 5 is used as cathode, and if it and the metal plate 4 which counters are energized as an anode plate, said metal ion will be generated between the titanium plates 5 and the metal plates 4 concerned concerned and between both other metal plate 4. The change to this anode plate and cathode places a predetermined time interval, and it sets it up with the power unit 17 so that it may change automatically, moreover, all metal plates can always supply chlorine or a metal ion — as — the metal plate 4 and the titanium plate 5 — respectively — \*\* — the plates which become each other do not become a like pole — it is made like (for example, it does not continue with cathode and cathode). And the water (henceforth electrolysis water) containing the stable metal ion and chlorine can be supplied by setting up so that the change to cathode from this anode plate and the change to an anode plate from cathode may be made into 1 cycle, for example, the process of a number cycle can be performed in 1 hour.

[0015] Thus, the made electrolysis water minds passage 13 from delivery 1b, and is \*\*\*\*\* to the water facility 11. And sterilization \*\*\*\* of water is performed in the water facility 11. Moreover, the drain 19 and the exhaust port 20 are established in the above-mentioned water

facility 11, and from there, through the hair strainer 21 and circulating-pump 22 grade, it is used for a fountain 23, or through another hair strainer 24 and circulating-pump 25 grade, the water filtered with delivery and its filter 12 is sent to the water facility 11, and circulates through a part through passage 13 again to a filter 12.

[0016] Here, by the catalysis of a metal ion, since the synergistic effect with chlorine arises, said electrolysis water can do so one 1000 times [ about 10 to ] the very high sterilization algicidal effect of this compared with the sterilization algicidal equipment of the water facility only using the conventional metal ion. In addition to use of chlorine-based drugs becoming unnecessary, moreover, the chlorine contained in the electrolysis water formed through said electrolysis process Since it has about 1/ of equivalent sterilization algicidal force by about ten to 1/50 residual chlorine concentration compared with the case where chlorine-based drugs are used, generating of evil which is produced from the amount of the chlorine generated compared with chlorine-based drugs being also little, and ending when the chlorine-based drugs mentioned above are used can be controlled. Furthermore, after the chlorine contained in the electrolysis water concerned performs sterilization \*\*\*\* of a water facility, it loses activity for a short time, and returns to low-concentration fused salt. Therefore, since it is not necessary to re-add a long duration sodium chloride once a sodium chloride is added by the water flowing back, it is efficient in respect of trouble and cost, safe also for a user, and gentle also to an environment. Moreover, since the yield of a metal ion and chlorine can be fluctuated by adjusting the amount of currents in a power unit 17 and adjusting the metal plate 4, the titanium plate 5, and the amount of electrolysis of a sodium chloride according to the situation of the dirt of a water facility reinforcing or reducing the sterilization algicidal force, sterilization \*\*\*\* of water can be performed efficiently and very easily.

[0017]

[Effect of the Invention] By according to this invention, arranging ion and a chlorine generator into the water containing the salinity of necessary concentration, and energizing an anode plate and cathode with a switch to the metal plate of two or more sheets, respectively Since in addition to metal ions, such as silver, chlorine will be generated and the synergistic effect with chlorine arises by the catalysis of a metal ion, compared with the case where sterilization processing of the water is carried out, one 1000 times [ about 10 to ] the very high sterilization algicidal effect of this can be done so only with a metal ion.

[0018] Moreover, only by according to this invention, the sterilization algicidal effect of the water of the markedly excellent water facility being obtained without using chlorine-based drugs, and moreover adjusting the amount of currents with a power unit Since the amount of a metal ion and chlorine can be adjusted, while raising the endurance of the system itself which reduction of cost is achieved [ itself ] while operation is simple, and makes water return to a water facility, a water facility safe for the body and comfortable can be supplied to a user.

[0019] Furthermore, since it can be used any number of times if platinum coating is carried out again when it is durable since coating of the titanium plate is carried out with platinum, and platinum coating has faded by prolonged use, it is economical, and since recycle use can be carried out, it can contribute also to a deployment of a resource, as a result environmental protection.

[0020] Moreover, when there are silver, copper, or two or more copper/silver alloy plates, among those since the lateral surface of the plate of two sheets arranged in the outermost part is also dissolved by the electrolytic action with a titanium plate, the medial surface and lateral surface of those plates can be exhausted equally, and can aim at efficient use.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** Drawing 1 is the perspective view of the important section of the ion and the chlorine generator 16 in the sterilization algicidal equipment concerning this invention.

**[Drawing 2]** Drawing 2 (A) is the front view of the appearance schematic diagram of ion and a chlorine generator, and drawing 2 (B) is this side elevation.

**[Drawing 3]** When the number of (A) of silver, copper, or copper/silver alloy plates is one as for drawing 3, silver, copper, or the copper/silver alloy plate of drawing 3 (B) is the outline side elevation of the important section of the ion and chlorine generator at the time of being two or more sheets (three sheets).

**[Drawing 4]** Drawing 4 is the schematic diagram having shown the water cycle system by which the sterilization algicidal equipment concerning this invention is carried out.

**[Description of Notations]**

- 1 Casing
- 2 Horizontal Plate
- 2a Engagement hole
- 3 Bolt
- 3a and 3b Thread part
- 4 Silver Plate, Copper Pole Plate, or Copper/silver Alloy Plate
- 5 Titanium Plate
- 6 Nut
- 11 Water Facility
- 12 Water Source of Supply
- 13 Passage
- 14 Sterilization Algicidal Equipment
- 16 Ion and Chlorine Generator
- 17 Power Unit

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**[Translation done.]**

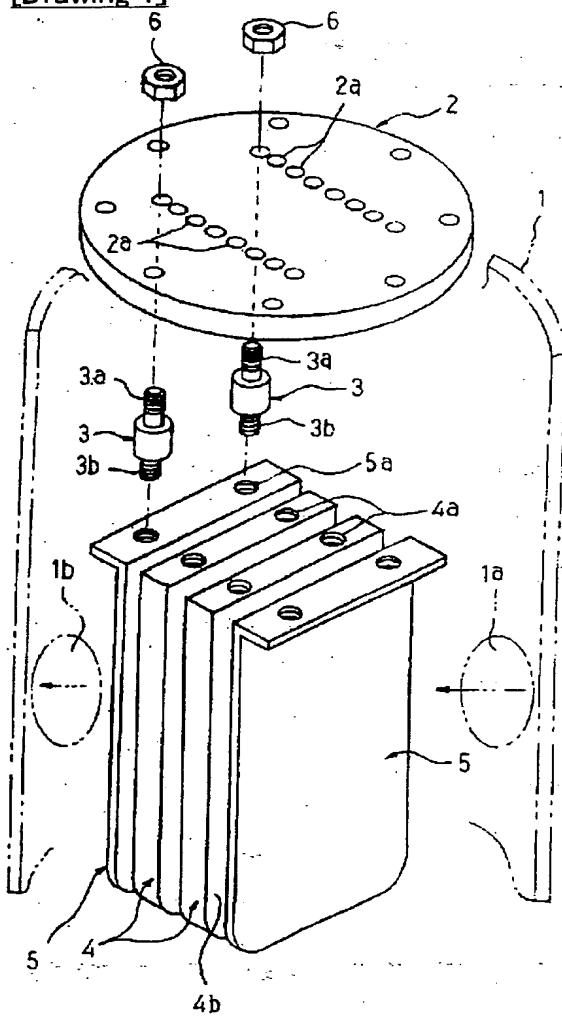
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## DRAWINGS

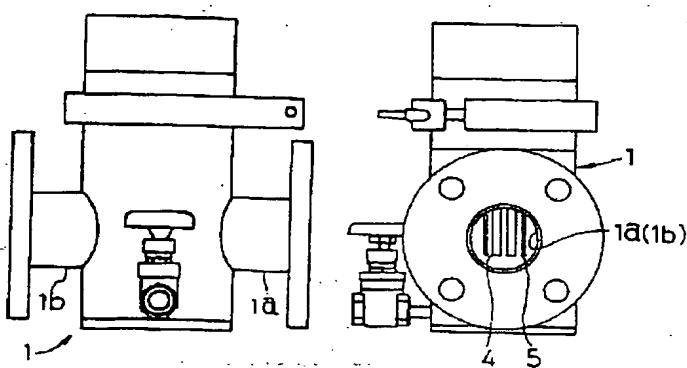
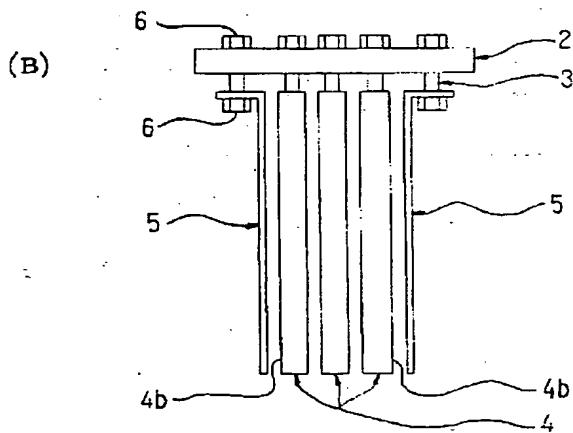
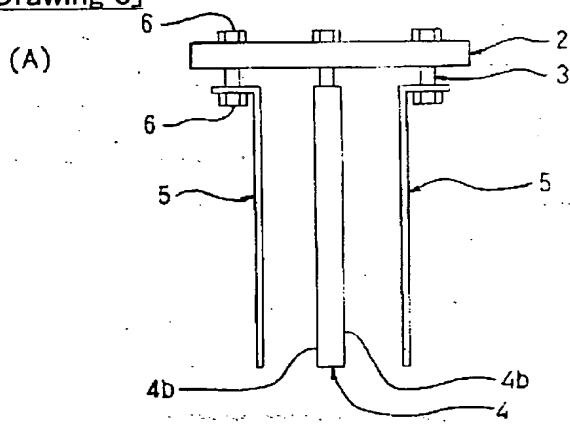
## [Drawing 1]

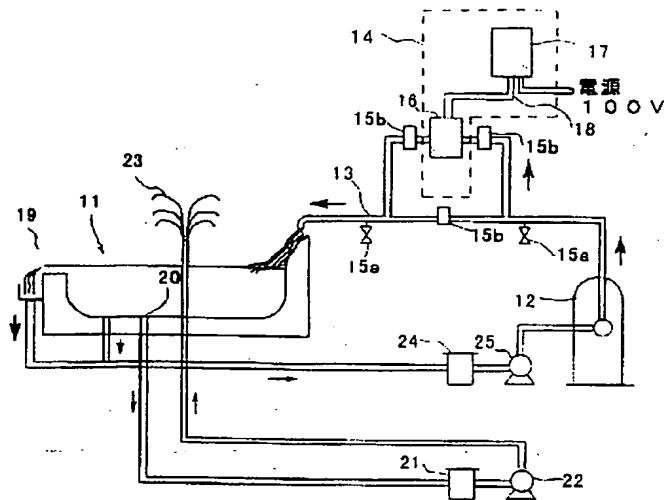


## [Drawing 2]

(A)

(B)

[Drawing 3][Drawing 4]



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